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(54) Improvement in the drum of a clothes drying machine

(57) Clothes drying machine comprising a horizontal-axis rotating drum, and a rack-like framework capable of being removably installed inside said drum, while remaining physically separated therefrom, and adapted to be secured in a stationary manner relative to the structure of said machine, wherein said rack-like framework is provided with a bottom wall and a rod aligned with said bottom wall and extending parallel to said axis, a handgrip being firmly joined to the free front end portion of said

rod. Said rod is adapted to be pushed into and/or pulled out from appropriate housing and retaining means associated to said bottom wall. When pulled out, said rod is capable of being rotated in the vertical plane up to a position lying above said bottom wall of the rack-like framework, with a rotary motion about a substantially horizontal axis across said housing and retaining means. When turned backwards, said rod takes an upward inclined position relative to said bottom wall.

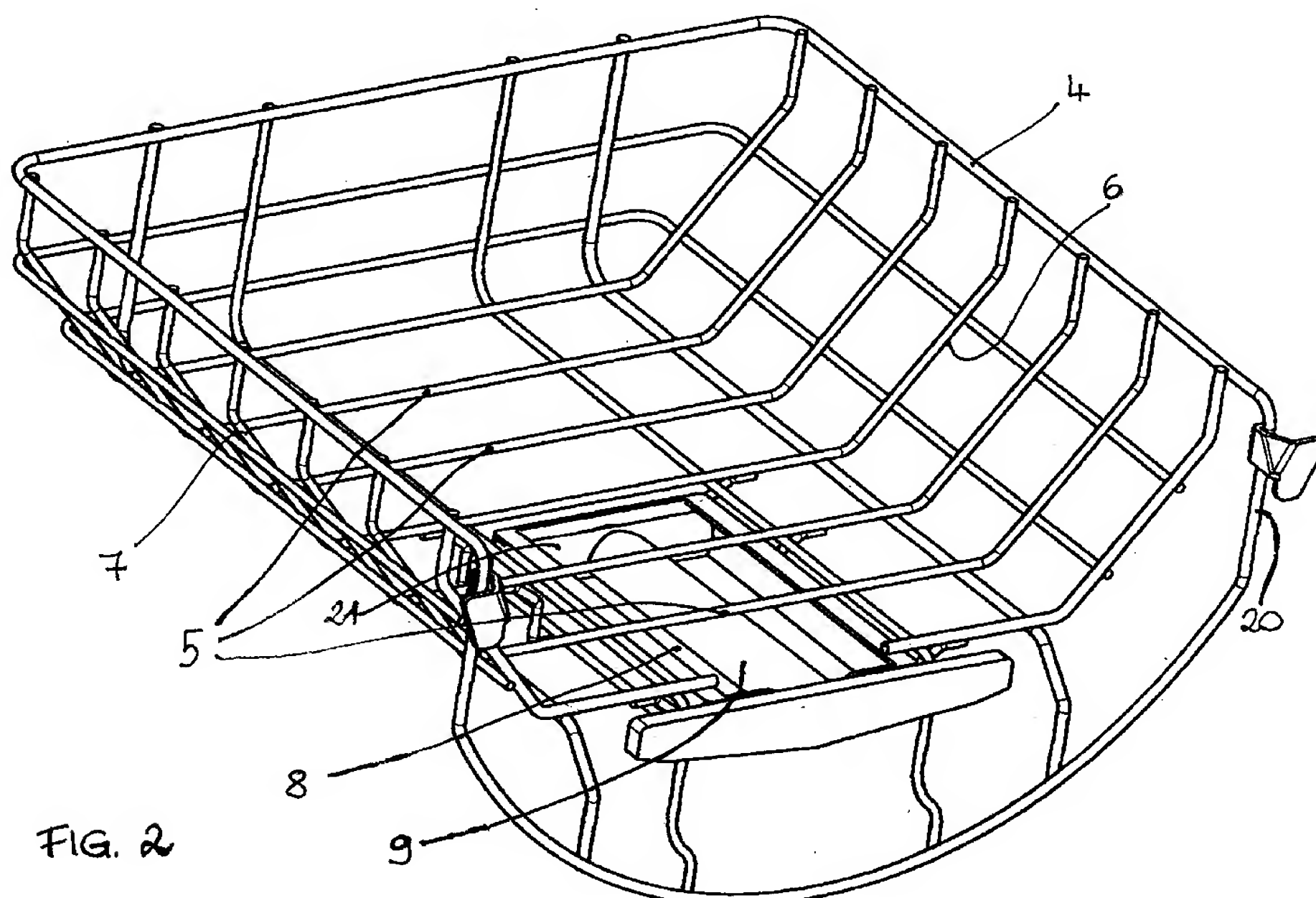


FIG. 2

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Description

[0001] The present invention refers to an improved kind of clothes drying machine, preferably of the type intended for use in households, provided with a substantially cylindrical drying drum adapted to rotate about its own axis, as well as static support means adapted to keep certain items to be dried, such as in particular footwear, suspended within said rotating drum.

[0002] While reference will be made to an autonomous clothes drying machine, i.e. a machine intended solely for drying clothes, throughout the following description, the explanations and descriptions given below shall be of course be understood as applying equally, and therefore effectively, to a so-called washer-dryer, i.e. a combination machine for washing and drying clothes.

[0003] The machines of the kind covered by the present invention are largely known in the art. They are for instance described in the European patent application no. 1 405 945 A2.

[0004] These machines are generally characterized in that they are provided with a variously shaped, movable framework with a netlike or rack-like structure adapted to be inserted in the rotating drum of the machine, but in such a manner as to remain in a stable or stationary relationship with the outer casing of the same machine, so as to keep a serviceable position for the items to be dried statically to rest thereupon or to be arranged therewithin.

[0005] The advantage of such solution is generally known to lie in the fact that possible delicate items to be dried are not subject to tumbling inside the rotating drum, so that they are not likely to suffer any damage at all. On the other hand, there are certain rigid, hard or heavy items, such as footwear articles, in a drying load that might well cause the other items in the same drying load to suffer damages if allowed to tumble therewith, so that the possibility for such items to be placed in or on a stationary framework that is physically separated from the rotating drum does fully away with this risk.

[0006] A similar solution involving the use of a removable netlike or rack-like framework intended for insertion within the drum of a clothes drying machine is described also in DE 40 34 660 A1. The solution proposed in this patent publication, however, has a number of drawbacks which, owing to them being extensively pointed out and described in the aforecited European patent application, shall not be set forth here for reasons of greater simplicity.

[0007] All above-mentioned solutions are exemplary and fully effective in view of their simplicity and ability to comply with the basic requirement of separating the wall of the rotating drum from the items to be dried.

[0008] However, when the above-mentioned kinds of removable drying frameworks are used in the current practice, a drawback is most frequently noticed to occur due to the fact that, owing to the substantially closed form thereof, some items to be dried, such as in particular footwear articles, can only be dried with some difficulty, and require anyway quite long a time to become ade-

quately dry, although being regularly hit longitudinally by a flow of dry hot air. This of course implies correspondingly and unnecessarily high energy costs.

[0009] Moreover, inserting and removing the removable support framework in and from the drum turns quite often out as being really inconvenient, since it is installed in a cantilevered arrangement, so that the need arises for a certain force to be exerted onto the outer parts thereof, i.e. the sole parts thereof that are accessible to the user.

[0010] It would therefore be desirable, and it is actually a main object of the present invention, to provide a clothes drying machine that is provided with a support framework that is capable of being removably inserted and installed in the drum of a clothes drying machine, however in a way as to be separated physically therefrom, and enables certain items to be dried to be placed thereupon or therein in an optimal posture and with an optimal inclination relative to the flow direction of the drying air, while at the same time enabling it to be most easily and conveniently inserted in the rotating drum, and removed therefrom, without any particular effort, and without this meaning that any significant penalty has to be paid for this as far as other performance aspects or functions are concerned.

[0011] According to the present invention, these aims, along with further ones that shall be described further on, are reached in a clothes drying machine incorporating the features as recited in the appended claims. Anyway, features and advantages of the present invention will be more readily understood from the description that is given below by way of nonlimiting example with reference to the accompanying drawings, in which:

- Figure 1 is a view from outside of a drum of a clothes drying machine provided with a movable support framework according to the present invention;
- Figure 2 is a view of the rack-like support framework of Figure 1, with a resting member in an inserted state;
- Figure 3 is a view of the rack-like support framework of Figure 2, but with the same resting member in a pulled-out state;
- Figures 4 and 5 are a top plan view and a median vertical sectional view, respectively, of the resting member shown in Figures 2 and 3;
- Figure 6 is a view of the rack-like support framework of Figure 3, but with the same resting member turned upwards and in an operative state;
- Figure 7 and Figure 8 are two corresponding perspective views of a varied embodiment of the support framework according to the present invention, with the resting member in its inserted and pulled-out

state, respectively;

- Figure 9 is a perspective, median and symmetrical vertical sectional view of the support framework of Figure 8;
- Figure 10 is a view of the support framework of Figure 9, but with the resting member turned upwards and in an operative state;
- Figure 11 is a perspective view of the resting member shown in Figures 7 and 8, in a state in which it is separated and isolated from the rest of the framework;
- Figures 12 and 13 are a top plan orthogonal view and a side plan orthogonal view, respectively, of the resting member of Figure 11.

[0012] In a clothes drying machine according to a generally known prior-art embodiment there are provided a rotating drum 1 holding the clothes to be dried, said drum being contained within an outer casing 2 and provided with a front opening 3, through which access can be gained into the drum; the machine further comprises means (not shown) adapted to direct a forced flow of hot dry air through said rotating drum along the horizontal axis thereof.

[0013] Housed in this rotating drum there can be a framework 4:

- having an open netlike structure, e.g. in the form of a large-meshed rack, so as to enable a flow of air to fully pass in all possible directions therethrough, and provided with at least a planar portion adapted to accommodate or support the items due to be dried under static conditions,
- being sized to such overall dimensions as to be able to be fully introduced and contained in said rotating drum 1, and
- being provided with support or resting means adapted to secure it and keep it in a stable position relative to said outer casing 2 of the machine, while however preventing it from ever coming into contact with the inner wall of said rotating drum 1.

[0014] In practical use, said support framework must first of all be removed from the drum, loaded with the items due to be dried under static conditions, and finally put again into the drum, where it is secured with appropriate fastening means (not shown).

[0015] As this is largely known in the art, the flow of hot dry air that is forced to move across the drum and through said support framework comes to necessarily flow over, hit and penetrate the items placed on said framework, wherein said items keep however standing still on the support framework and do not enter into contact with the rotating drum itself, thereby bringing about

the desired drying effect.

[0016] According to a preferred embodiment of the present invention, and with reference to Figures 1, 2 and 3, said support framework is removable from the interior of the drum, in order to be conveniently loaded outside the machine with the items to be placed there for drying under static conditions, and is adapted to be installed within the drum in such a manner as to ensure that it will not come into contact with the same drum at any moment during the operation of the machine. To this purpose, said support framework is kept hanging, i.e. in a suspended condition within the rotating drum by securing it - using means that are widely known as such in the art - between the outer frame member 20 of the framework 4 and appropriate engagement means provided at a proper site along the edge of the access opening of the machine.

[0017] The support framework has a lower or bottom structure 5 extending horizontally and, preferably, two side wall 6, 7 arising from the opposite sides of said bottom structure.

[0018] A box-like member 8 is applied onto the lower side of said bottom structure and, from this box-like member 8, there projects a forward-oriented rod 9, at the front end portion of which there is provided a handgrip 10.

[0019] This rod is slidable relative to said box-like member 8, in the sense that it can be fully inserted therein, as shown in Figure 2, or pulled out thereof, as shown in Figures 3, 4 and 5, with a translatory movement in a direction that is substantially parallel to the axis of the rod and, therefore, parallel to the plane of said bottom structure 5.

[0020] When pulled out, said rod is capable of being turned upwards with a rotary movement round a pivotal centre located at a point inside said box-like member 8, but cannot on the contrary be turned downwards. This practically enables one of the basic aims of the present invention, consisting in providing said support framework with gripping means adapted to make it more convenient for said support framework to be removed and lifted, to be effectively reached: in fact, it only takes to pull out the handgrip 10 from the box-like member 8 and even just slightly lift it for also the support framework 4 to be lifted and, hence, be capable of being released from the means securing it to the machine and, eventually, being removed from the machine.

[0021] In fact, if said rod 9 cannot rotate downwards relative to the box-like member 8, said support framework 4 will in return be unable to move or rotate downwards relative to said rod.

[0022] As far as the second aim of the present invention is concerned, this is reached in the following manner: said handgrip 10 is embodied as a simple elongated cylindrical body joined at its centre line with the front end portion of said rod 9 and oriented in the horizontal plane, as this is shown symbolically in Figures 4 and 5.

[0023] Therefore, since also said rod is capable of rotating in a vertical plane, it ensues that said handgrip 10, as embodied in the above-described manner, remains

constantly horizontal, even when it is raised by turning the rod upwards.

[0024] The described devices and parts are so sized and arranged as to enable the upward rotary motion of the rod 9 to continue up to beyond the right angle, so that, by keeping being turned in this way, the rod and the associated handgrip eventually start to descend; however, they do so in a space lying vertically above said bottom structure 5, as best shown in Figure 6.

[0025] At a pre-defined position, said rod 9 is then blocked in its movement by proper check means, against which it comes to simply rest in a fully stable condition, but in an inclined position.

[0026] In such position, said handgrip 10, which is provided at the end portion of the rod 9, remains most obviously in a raised condition above said bottom structure 5.

[0027] As a result, an adequate support is thereby provided, as formed by said handgrip 10 being so set in such raised position above said bottom structure, which can advantageously be used to have the various items to be dried under static conditions, in particular footwear articles, placed thereupon in a most appropriate inclined arrangement, since the flow of hot dry air investing said items in a direction parallel to said bottom structure 5, is in this way enabled to also penetrate into said items, thereby enhancing the drying effect and considerably reducing the time required for said items to become dry.

[0028] As far as said box-like member 8 is then concerned, this is preferably embodied in the following manner: with reference to Figures 2 and 4, said box-like member is situated under said bottom structure 5, and preferably on the front portion thereof, so that said handgrip 10 can be most easily and conveniently grasped and pulled out or, conversely, be pushed inwards to cause the rod 9 to slide into said box-like member 8. This box-like member 8 is hollow inside and accommodates a sliding cross-member 21 secured with its median portion to the rear end portion of said rod 9 sliding into said box-like member 8.

[0029] Substantially, said sliding cross-member 21 forms a kind of "slide" capable of moving rectilinearly on runners within said box-like member 8 into two extreme opposite positions corresponding to respective full-out and full-in positions of said rod 9, as shown in Figures 2 and 3.

[0030] In addition, said sliding cross-member 21 forms the horizontal pivot about which the rod 9 rotates.

[0031] The very concept of the rod 9 and the box-like member 8 is such as to allow for further simplified embodiments of the present invention. In this connection, with reference to Figures 7 to 13, the box-like member 8 is no longer firmly joined to or integral with the support framework, nor are there provided means adapted to enable said rod 9 to be pushed in and pulled out therefrom. Quite at the contrary, there is provided a slide 40 to replace said box-like member 8, wherein said slide is adapted to slide back and forth, i.e. backwards and forwards, relative to said bottom structure 5 through the use of

means that are largely known as such in the art and, therefore, shall not be explained here any further. Said rod 9 is applied with the inner end portion thereof to said slide 40, so that any forward or backward displacement of said rod 9 is brought about by simply pulling or pushing the rod 9 itself, which in turn will pull or push said slide 40 into the two respective positions shown in Figures 8 and 7.

[0032] As regards the capability of the rod 9 to be rotated in the vertical plane and backwards, this is achieved by pivotally hinging the "inner" end portion of the rod on a pin 41 provided horizontally in a front portion of said slide 40, as well as by providing an appropriate downward-oriented curvature 42 in the contour of the rod 9, preferably in the section thereof that lies closer to said slide 40, as this is best shown in Figures 11 to 13.

[0033] The above-mentioned curvature 42 is arranged and sized so that, when the rod is turned backwards in the afore-described way, the cavity 44 resulting from such curvature (see Figure 13) engages one of the reticular elements 43 that form said rack-like bottom structure 5 (Figure 10) and extend orthogonally to the vertical plane of rotation of the rod 9. In this way, the rod 9 is blocked in the desired backward inclined position, thereby achieving the desired result in a simple and easy manner.

Claims

1. Clothes drying or combined washing and drying machine comprising a drum (1) having a substantially horizontal axis and adapted to be rotatably driven about said axis, and provided to hold the clothes to be dried, as well as means adapted to circulate a flow of hot dry air inside said drum in a direction parallel to said axis, said machine being further provided with a rack-like framework (4) capable of being removably installed inside said drum, while remaining physically separated therefrom, and adapted to be secured in a stationary manner relative to the structure of said machine, **characterized in that:**

- said rack-like framework is provided with a bottom or horizontal structure (5) and a rod (9) that is substantially aligned with said bottom structure and extends parallel to said axis, a handgrip (10) being firmly joined to the free front end portion of said rod,
- wherein said rod is adapted to be pushed into and/or pulled out from appropriate housing and retaining means associated to said bottom structure (5) with a substantially horizontal movement.

2. Machine according to claim 1, **characterized in that** said housing and retaining means comprise:

- an internally hollow box-like member (8),
- a sliding cross-member (21) joined with the median portion thereof to the opposite end portion of said rod at the opposite side of said free end portion thereof, and adapted to slide inside said box-like member (8).

3. Machine according to claim 1, **characterized in that** said housing and retaining means comprise:
- a slide member (40) capable of slidably displacing relative to said bottom structure (5),
 - a pin (41) pivotally engaging the inward facing end portion of said rod (9) with a preferably front portion of said slide member (40).
4. Machine according to claim 3, **characterized in that** said rod is provided with a downward extending curvature (42) forming a corresponding cavity (44) in the upper edge of said rod, said cavity being adapted to engage one of the reticular or rack elements (43) forming said bottom structure (5) when said rod is turned upwards and backwards by rotating round said pin (41).
5. Clothes drying or combined washing and drying machine according to any of the preceding claims, **characterized in that** said rod (9), when pulled out, is capable of being rotated in the vertical plane up to a position lying above said bottom structure (5), with a rotary motion about a substantially horizontal axis passing across said housing and retaining means.
6. Clothes drying or combined washing and drying machine according to claim 5, **characterized in that** said rod (9), when so turned backwards, takes an inclined orientation relative to said bottom structure, with an upward facing inclination from the hinged front portion to the rear portion of said rod.
7. Machine according to any of the preceding claims, **characterized in that** said handgrip (10) is shaped in the form of an elongated cylindrical body arranged horizontally across said rod.
8. Machine according to any of the preceding claims, **characterized in that** said rack-like support framework is provided with a rear portion and two side walls (6, 7) at the opposite sides thereof, but is not provided with any front structure.

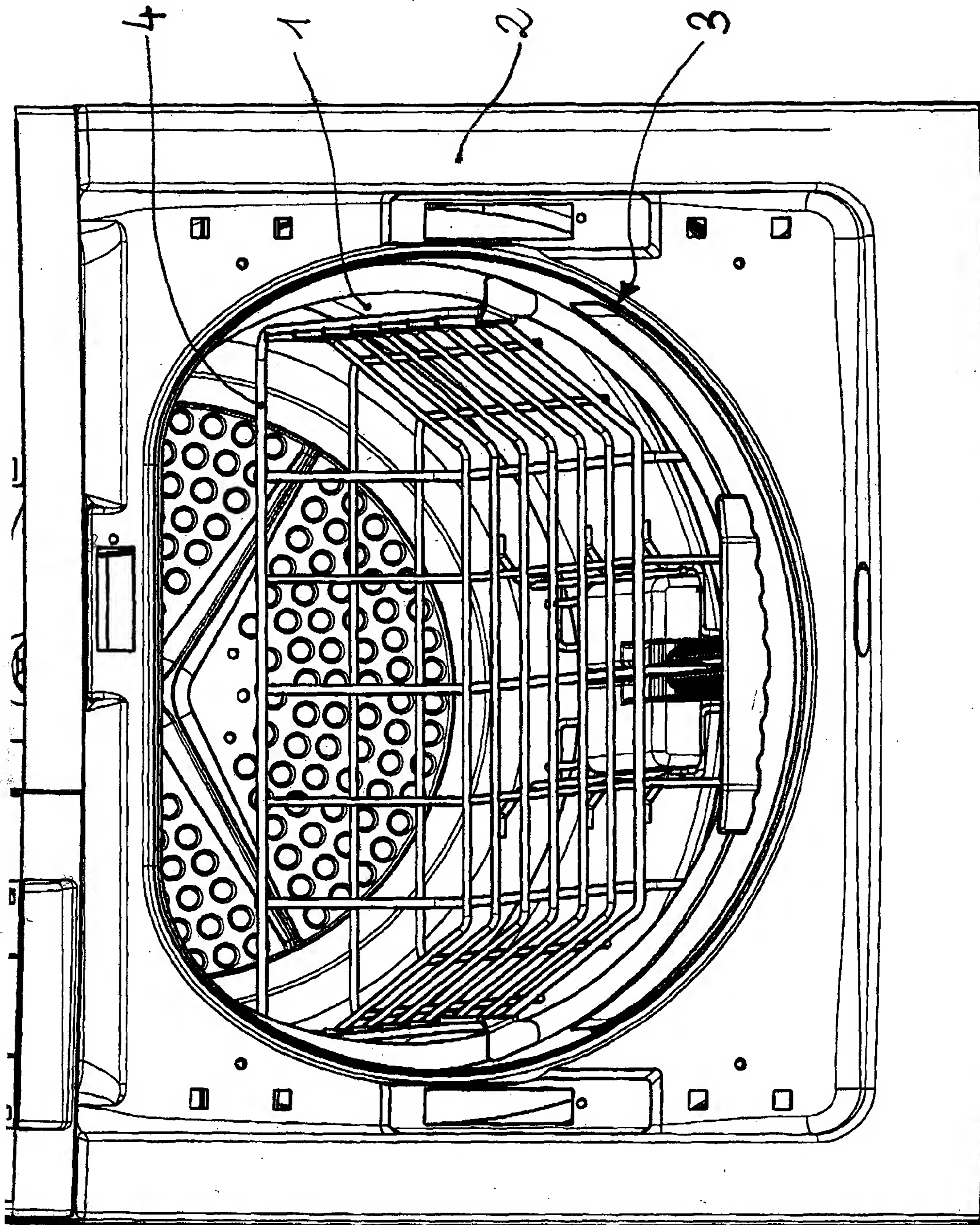


FIG. 1

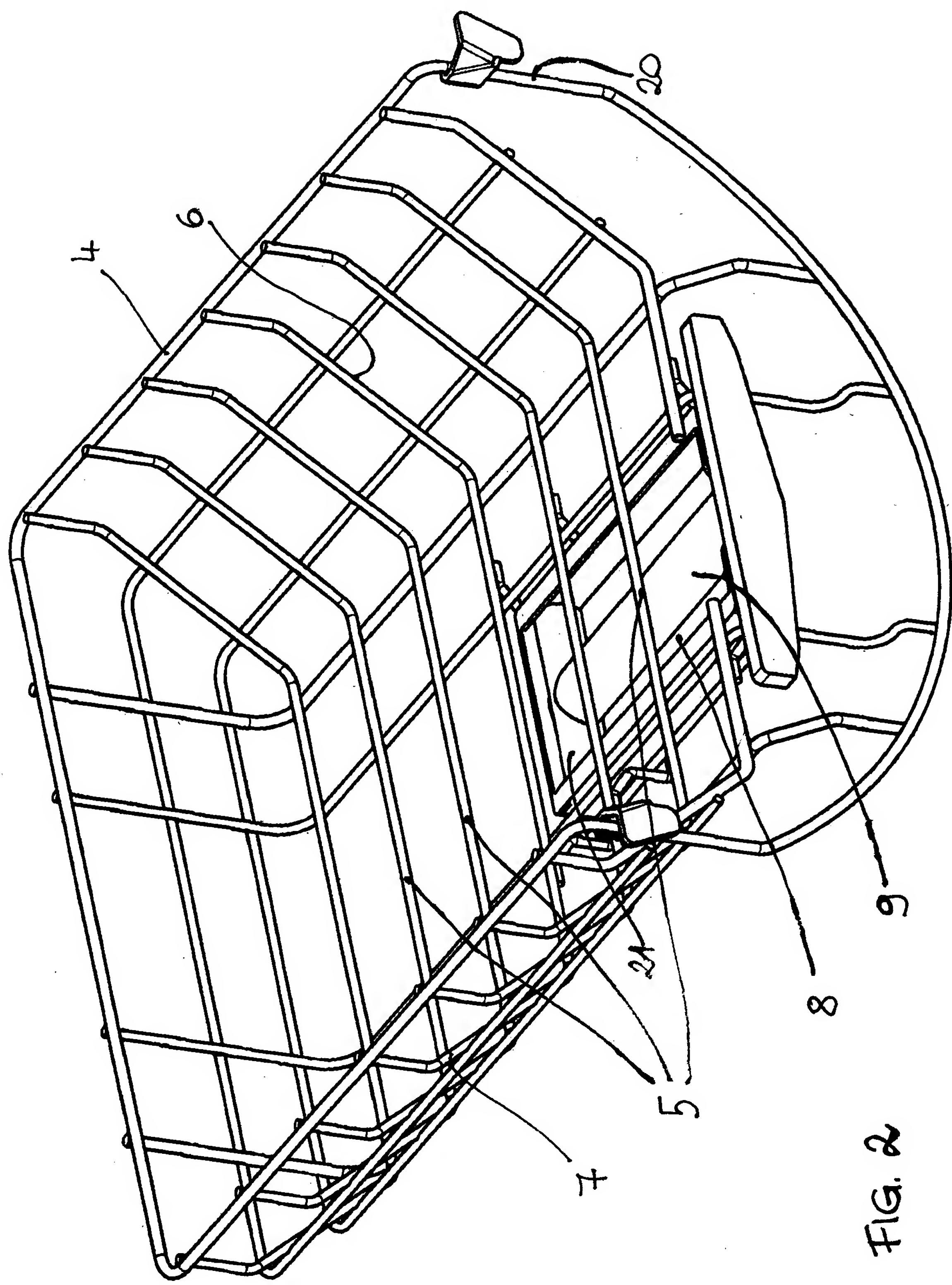


FIG. 2

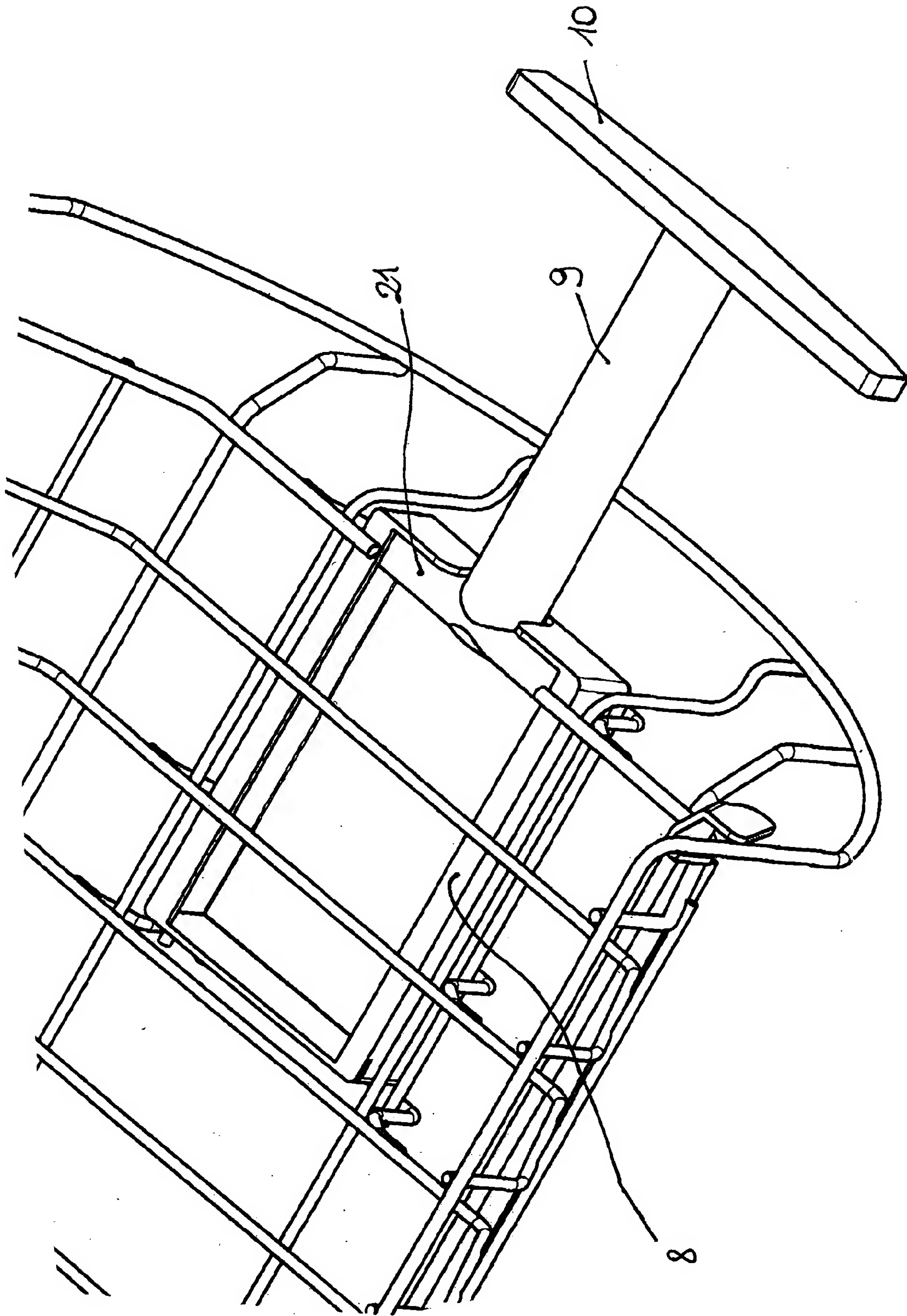


FIG. 3

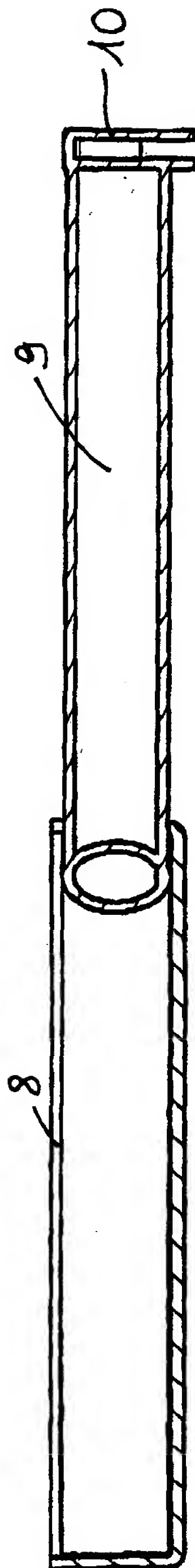


FIG. 5

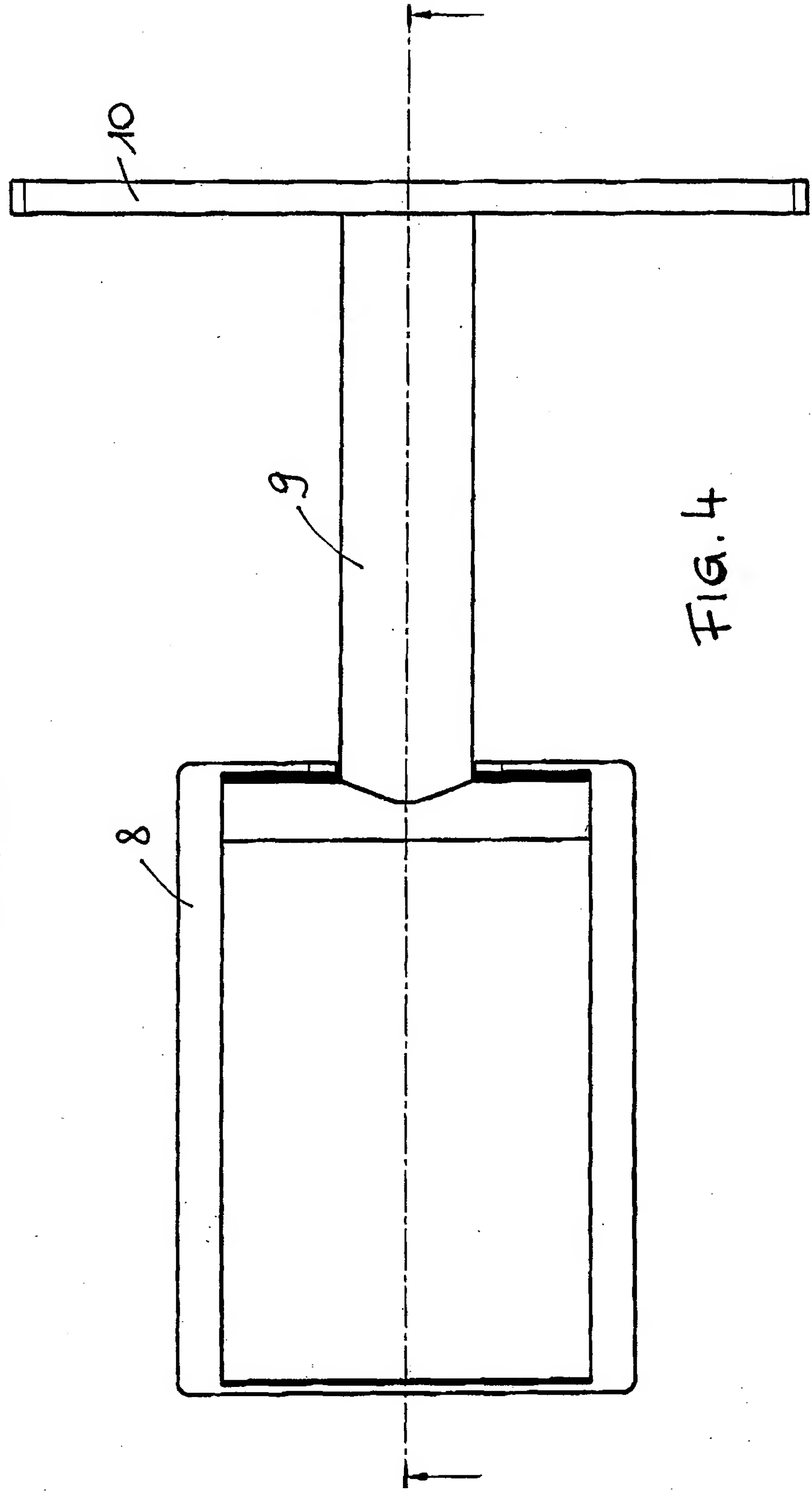


FIG. 4

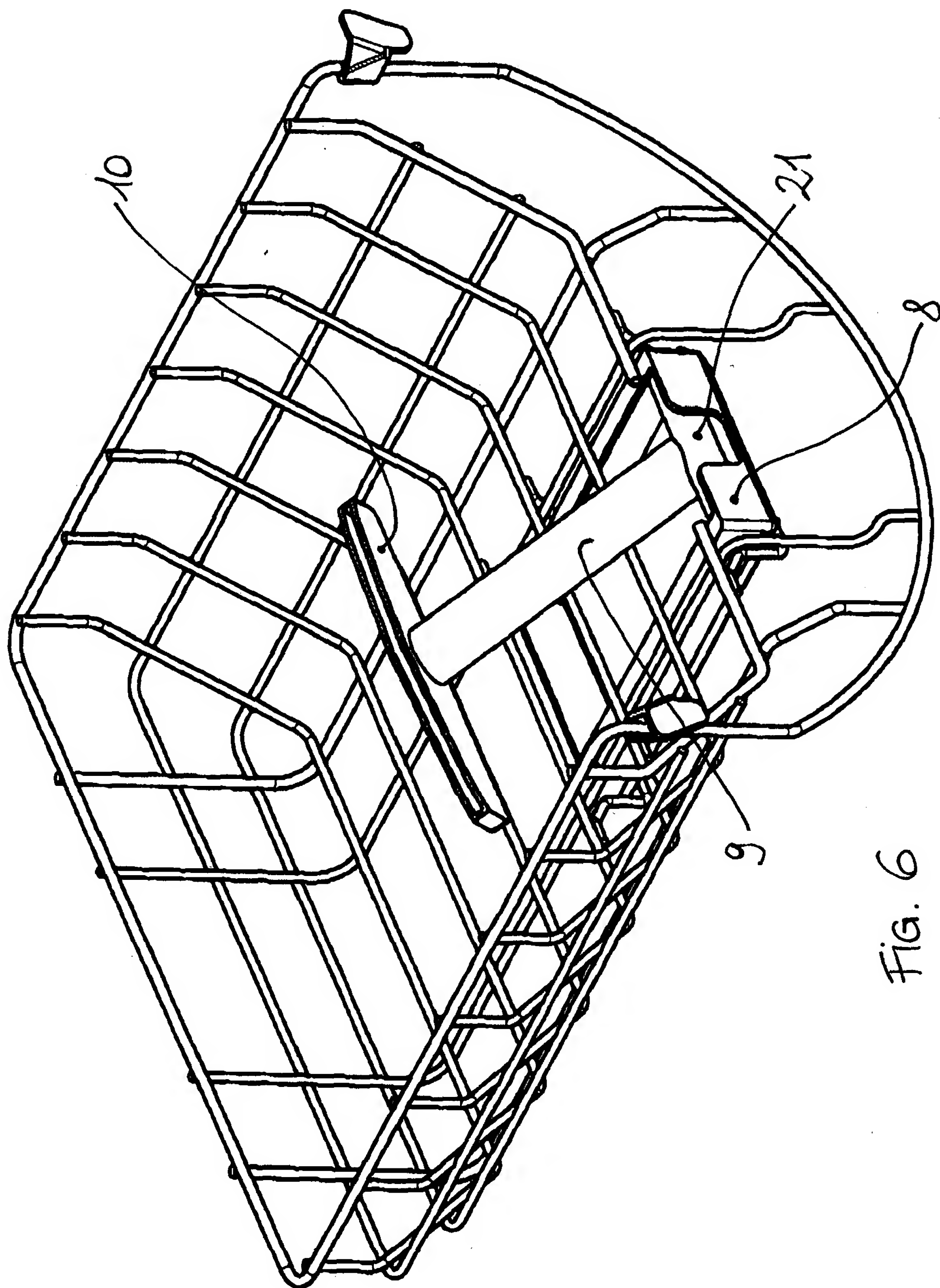


FIG. 6

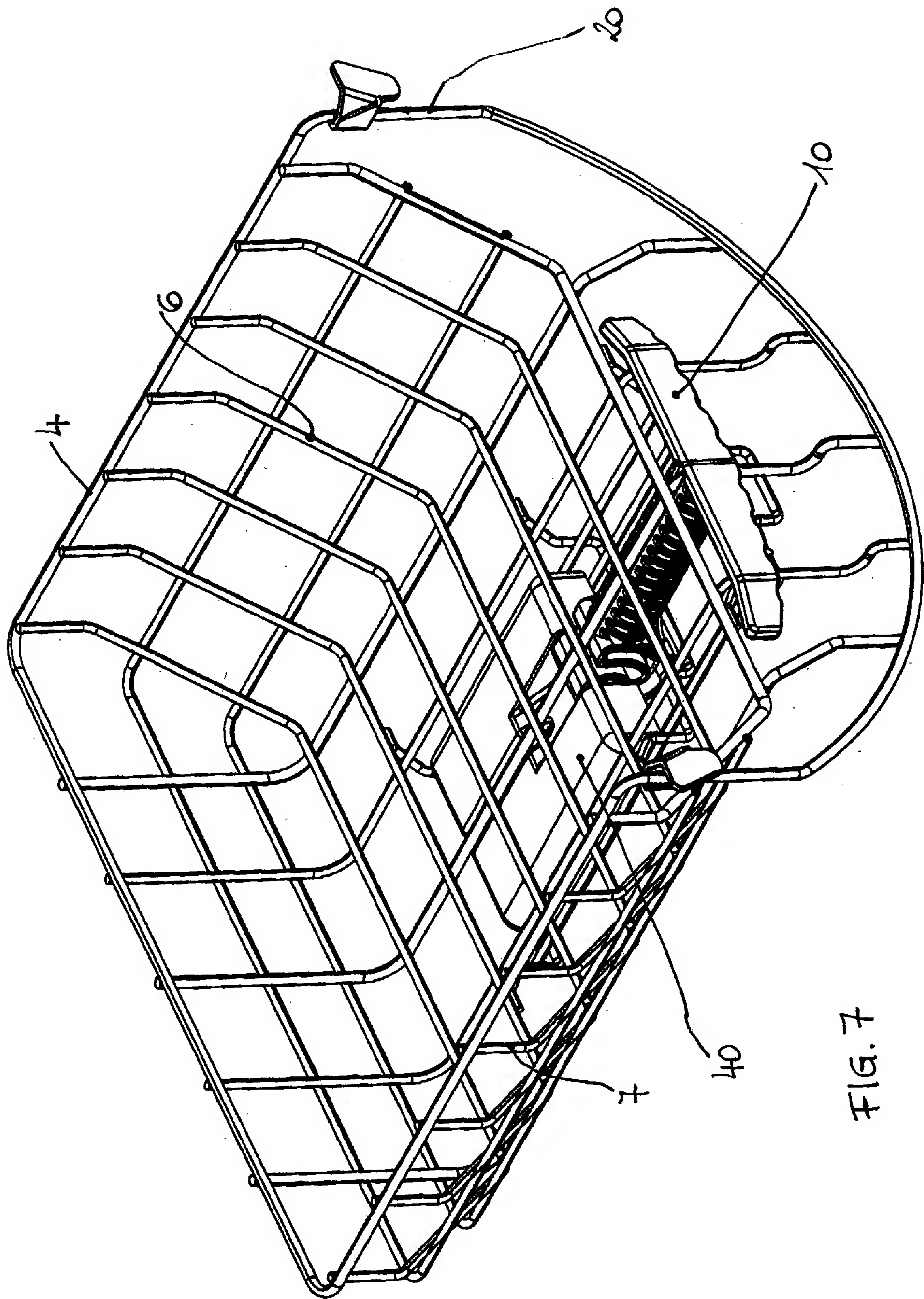


FIG. 7

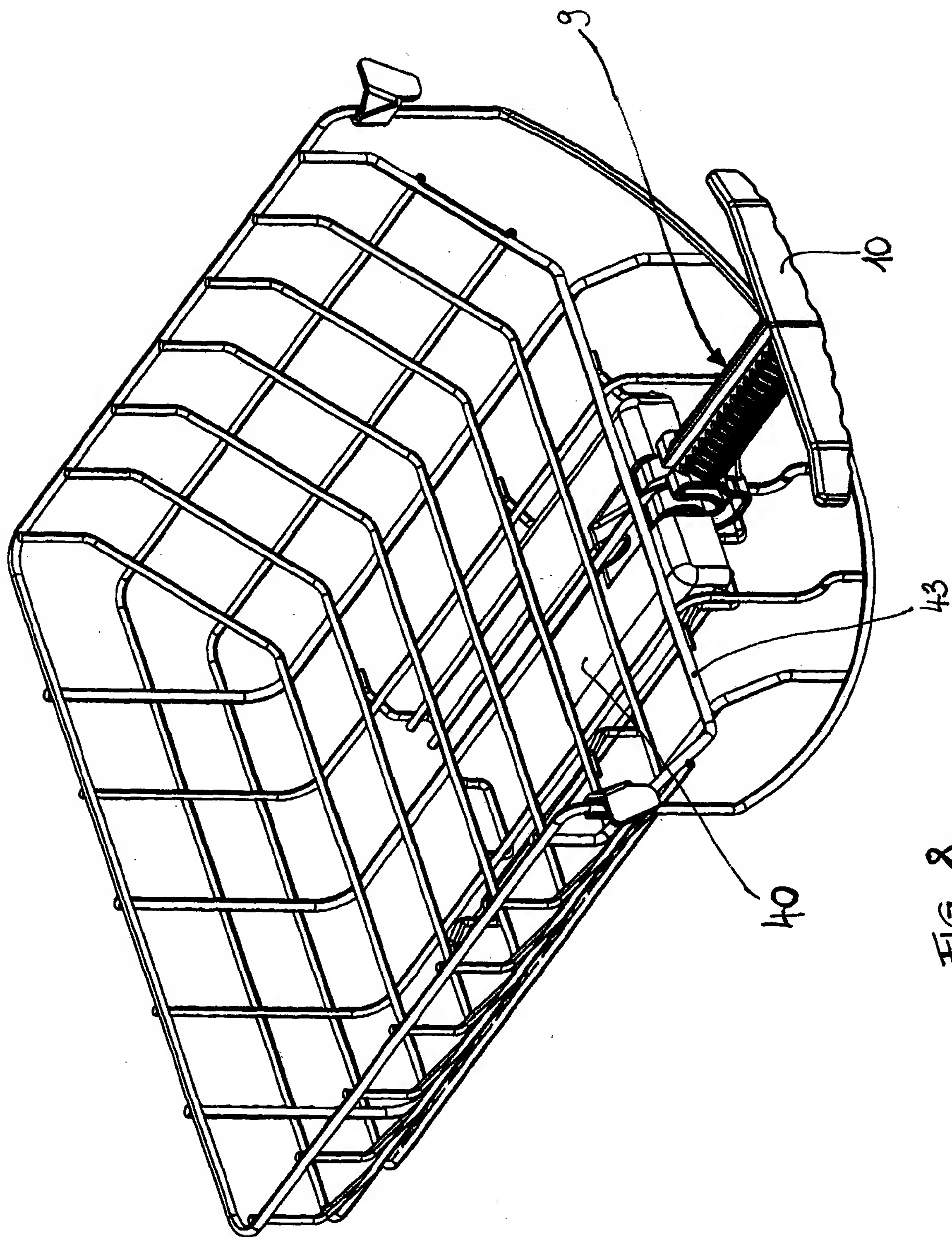


FIG. 8

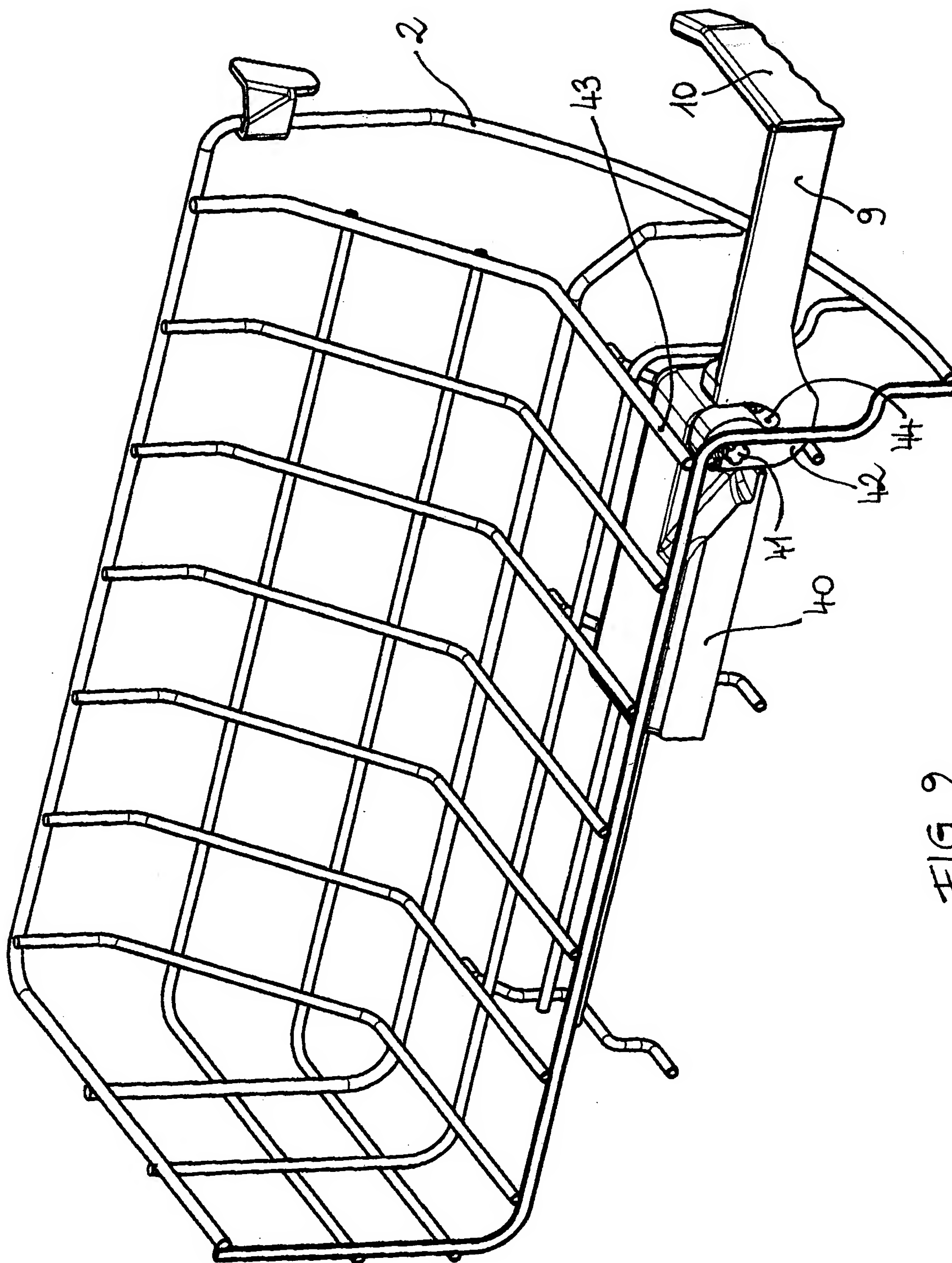


FIG. 9

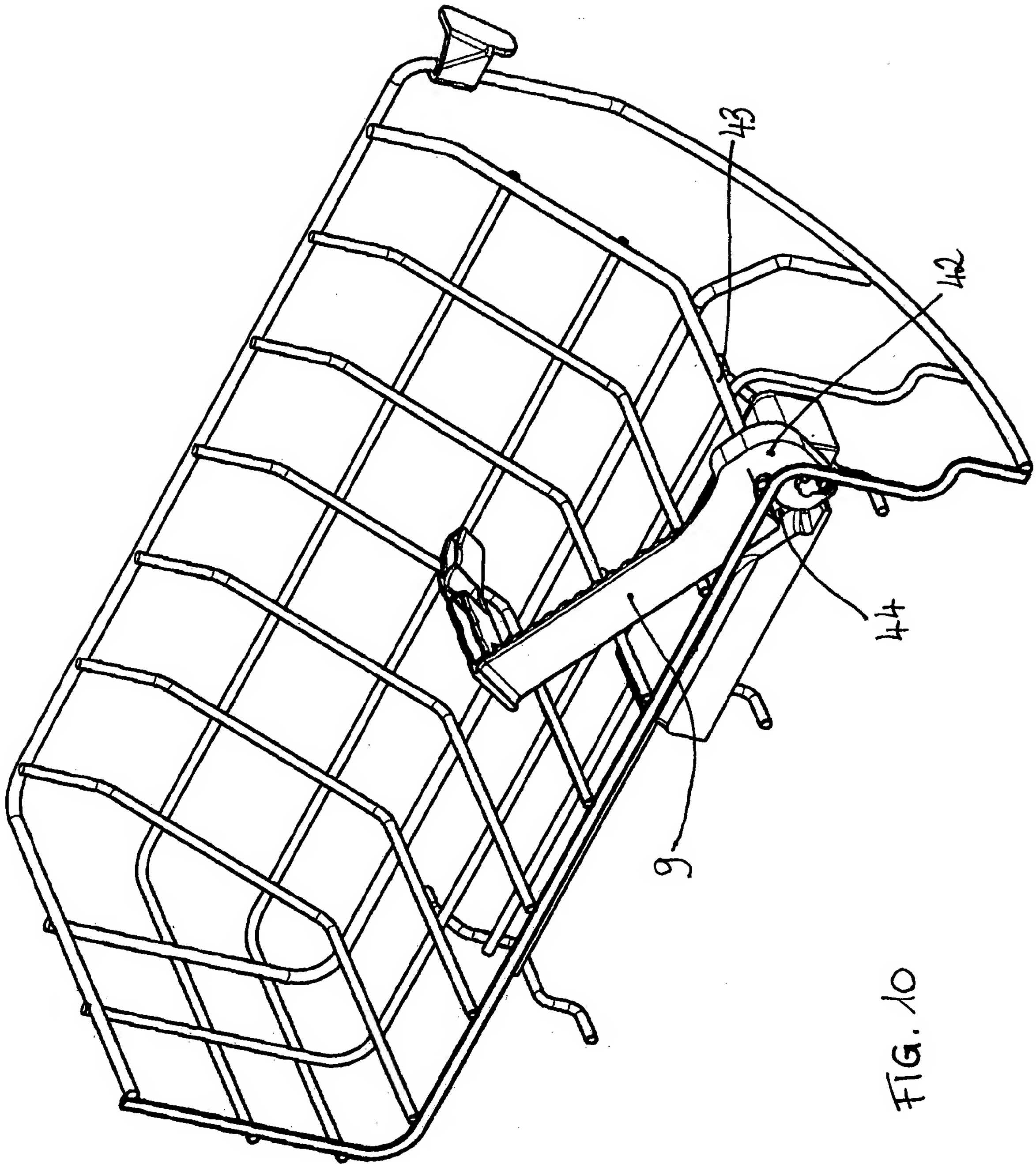


FIG. 11

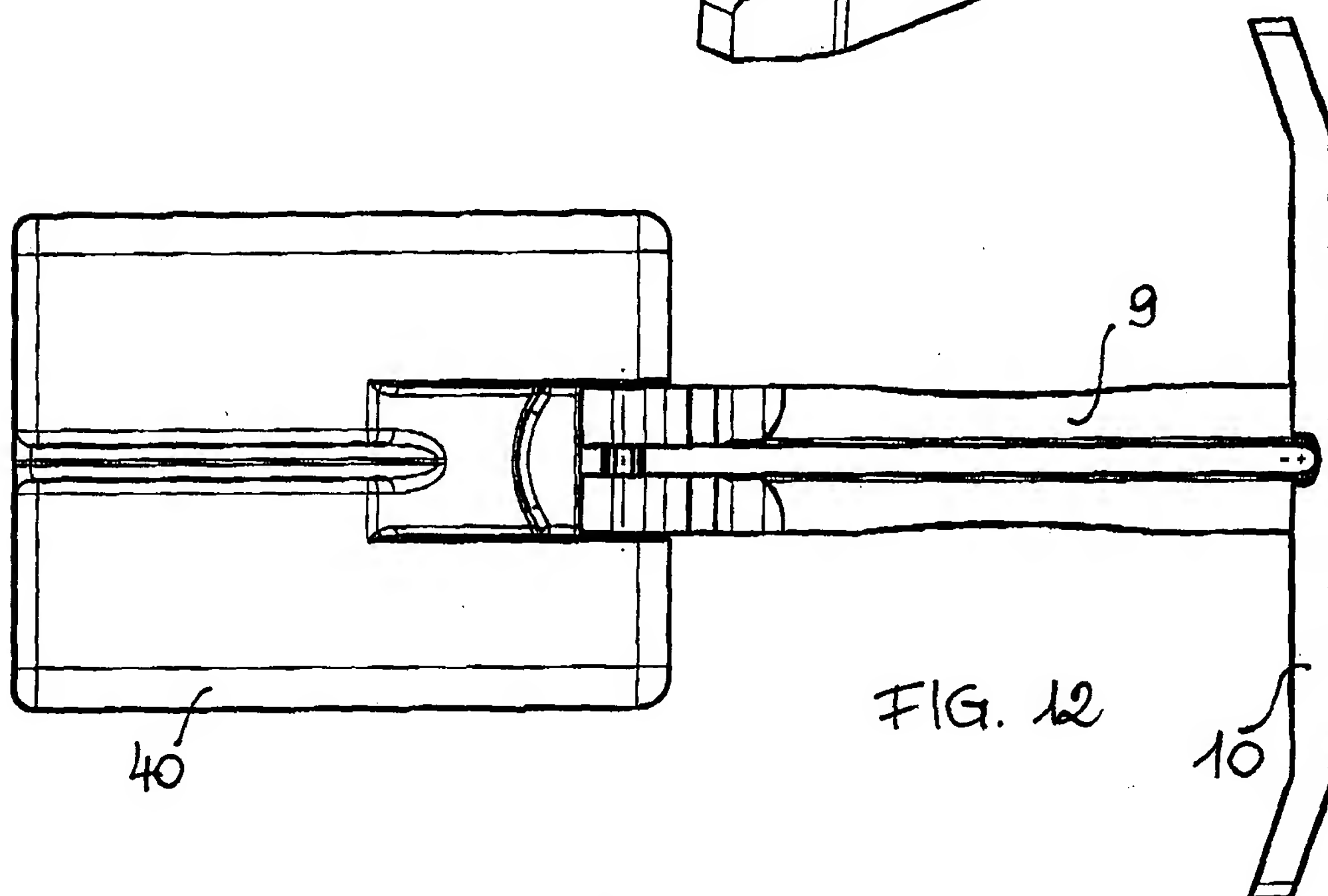
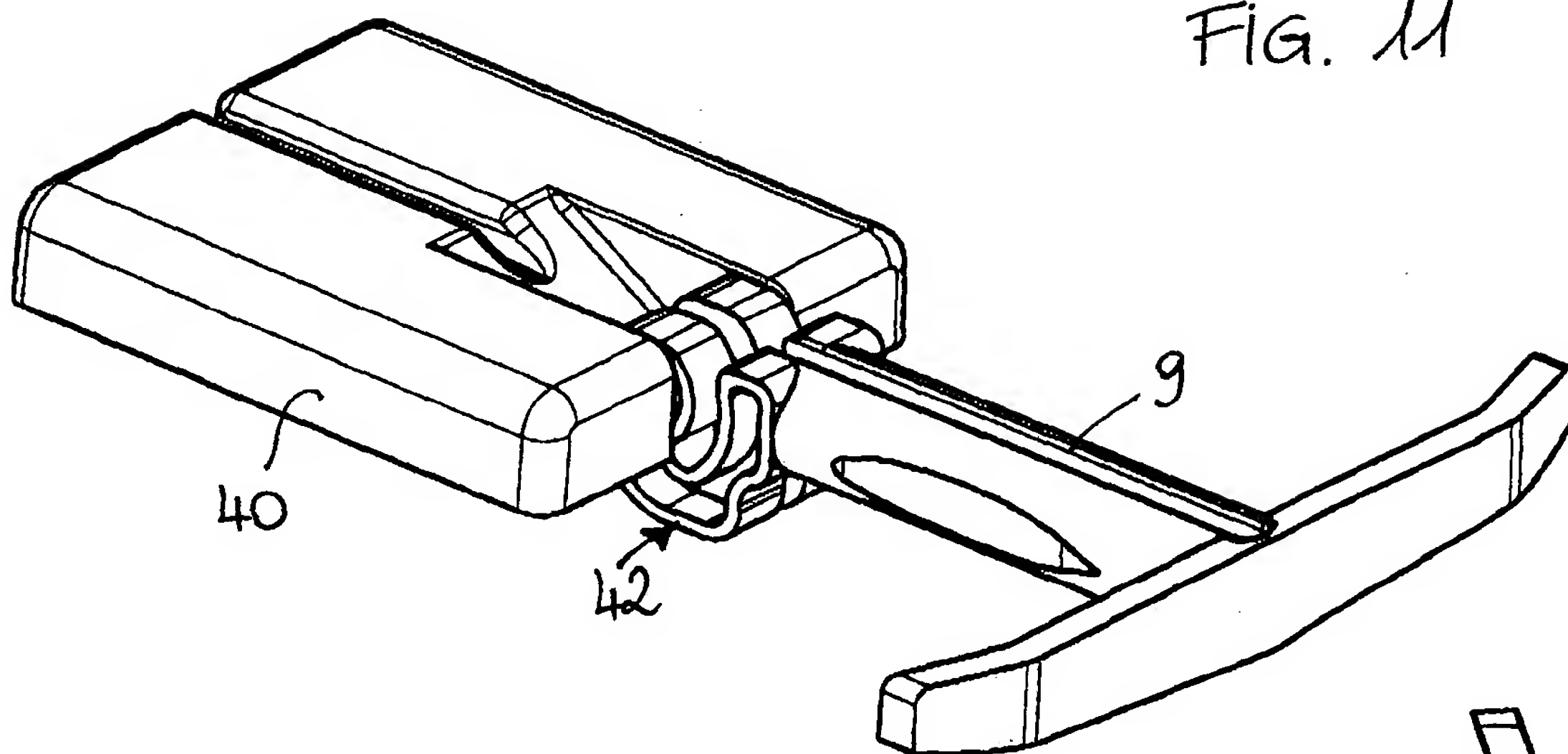


FIG. 12

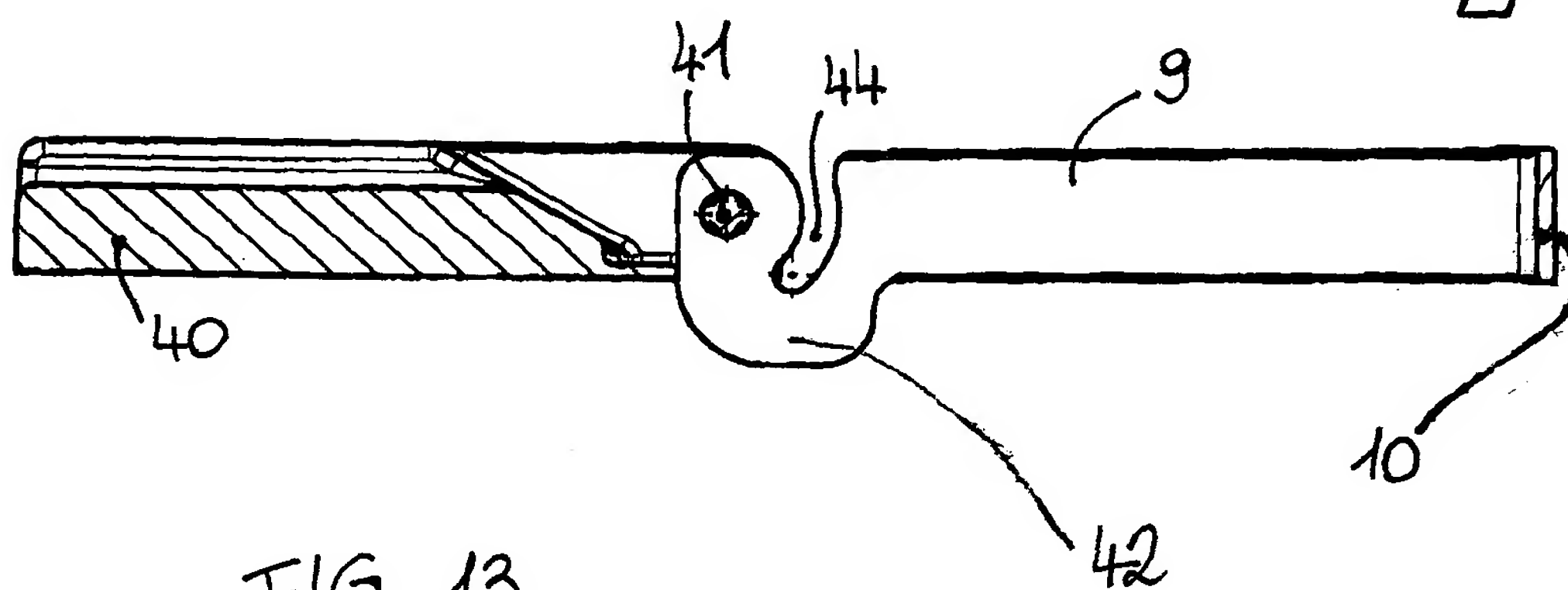


FIG. 13



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 11 2024

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 724 095 A (LAUE T,US ET AL) 3 April 1973 (1973-04-03) * the whole document *		INV. D06F58/04
A	US 2003/010736 A1 (HOPE RICHARD) 16 January 2003 (2003-01-16) * page 2, paragraph 25 - paragraph 31; figures 1-4 *	1-8	
A	US 4 091 548 A (DAILY ET AL) 30 May 1978 (1978-05-30) * the whole document *	1-8	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 May 2006	Examiner Lodato, A
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ON EUROPEAN PATENT APPLICATION NO.

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17-05-2006

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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PRIORITY-DATA: ITPN20050004U (February 10, 2005)

ABSTRACT:

CHG DATE=20060818 STATUS=O>Clothes drying machine comprising a horizontal-axis rotating drum, and a rack-like framework capable of being removably installed inside said drum, while remaining physically separated therefrom, and adapted to be secured in a stationary manner relative to the structure of said machine, wherein said rack-like framework is provided with a bottom

wall and a rod aligned with said bottom wall and extending parallel to said axis, a handgrip being firmly joined to the free front end portion of said rod. Said rod is adapted to be pushed into and/or pulled out from appropriate housing and retaining means associated to said bottom wall. When pulled out, said rod is capable of being rotated in the vertical plane up to a position lying above said bottom wall of the rack-like framework, with a rotary motion about a substantially horizontal axis across said housing and retaining means. When turned backwards, said rod takes an upward inclined position relative to said bottom wall.